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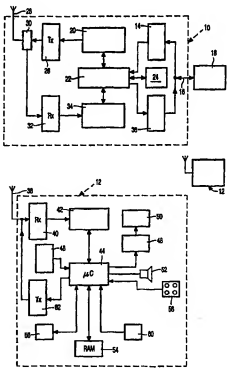
(54) Title: METHOD OF, AND SYSTEM FOR, EFFECTING CASHLESS TRANSACTIONS AND A DEVICE FOR USE IN SUCH A SYSTEM

(57) Abstract

A method of, and system for, effecting a cashless transaction in which payment is effected through the agency of a device (12) comprising a point-to-point radio transceiver, such as a two-way pager, having non-volatile storage means (56) containing data, such as a monetary units or credit card data, required in the execution of the transaction. The monetary units are credited to the device by an over-the-air transmission and are deducted at the point of sale. A credit card sale is effected over-the-air with a primary station (10) coupled to a suitable data base (18).



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DESCRIPTION

METHOD OF, AND SYSTEM FOR, EFFECTING CASHLESS TRANSACTIONS AND A DEVICE FOR USE IN SUCH A SYSTEM

Technical Field

The present invention relates to a method of, and system for, effecting cashless transactions and to a device for use in such a system. The present invention has particular, but not exclusive, application to effecting payment for goods and/or services by the electronic transfer of monetary units or by a credit transaction.

Background Art

European Patent EP-B-0 538 933 discloses down loading information into a pager memory from an insertable card. The information may include prepaid credit units which are spent by usage of the pager itself, for example on a per hour basis.

Smart cards themselves are used in many applications including making cash payments against pre-stored credit units. The smart card has electrical contacts which mate with corresponding contacts in a card writing/reading device and the user selects the amount of money to be loaded electronically into a non-volatile memory of the card, assuming always that the user is in credit. The card is then available for use by the user to pay for small transactions which is achieved by inserting the smart card into a card reader and the operator deducting the requisite amount of cash from the non-volatile memory of the smart card. Whilst smart cards are proven to be of value in many areas and particularly in the payment of cash transactions, their disadvantage is that the user always has to take them to a suitable writing/reading device for them to be credited with more monetary units or for monetary units to be deducted.

Payments by credit card either require the card to be presented by the

user at the point of sale or for the card number and expiry data to be given, for example over the telephone. Frequently the vendor makes a check to obtain authorisation of the transaction involved.

Disclosure of Invention

An object of the invention is to facilitate the making of financial transactions.

According to one aspect of the present invention there is provided a method of effecting a cashless transaction in which payment is effected through the agency of a device comprising a point-to-point radio transceiver having a non-volatile storage means containing data required in the execution of the transaction.

The data stored in the non-volatile storage means may comprise pre-stored monetary units from which deductions are made in a payment transaction or credit card details from which payment is made as a credit card transaction.

According to a second aspect of the present invention there is provided a method of effecting a cashless transaction, comprising presenting a device having a point-to-point radio transceiver and a non-volatile storage means storing units of consumable data to a point of sales, effecting payment by deduction of at least one unit of the consumable data from those stored in the non-volatile storage means by a two-way radio transaction or by a credit transaction, relaying details of the transaction to a remote primary station and storing details of the transaction in the non-volatile storage means.

When the stored consumable data becomes depleted the device may transmit a request to the primary station to replenish the consumable data in the non-volatile storage means, the primary station in response to verifying that the request message is genuine, transfers consumable data as a radio signal to the requesting device, said device storing the consumable data in the non-volatile storage means. The request message may include a personal identification code of the user of the device.

If desired the level of the consumable data stored in the non-volatile storage means may be monitored and when it reaches or is below a preselected threshold level, a replenishment signal is generated automatically.

According to a third aspect of the present invention there is provided a system for effecting a cashless transaction, comprising a device having point-to-point radio transceiving means and a non-volatile storage means containing data required in the execution of a transaction.

According to a fourth aspect of the present invention there is provided a system for transferring consumable data to a non-volatile memory, comprising a primary station having means for connection to a source of the consumable data and means for transmitting at least some of the consumable data when required, at least one secondary station having receiving means for receiving signals transmitted by the primary station, a non-volatile storage means having a storage area for the consumable data, means for transferring the consumable data received by the receiving means to the non-volatile storage means and means for altering the level of the consumable data stored in the non-volatile memory.

According to a fifth aspect of the present invention there is provided a device for use in effecting a cashless transaction, the device comprising point-to-point radio transceiving means and a non-volatile storage means containing data required in the execution of a transaction.

According to a sixth aspect of the present invention there is provided a secondary station for use in a system for transferring consumable data to a non-volatile memory, the system comprising a primary station having means for connection to a source of the data and means for transmitting the data when required and at least one secondary station, the secondary device having receiving means for receiving signals transmitted by the primary station, non-volatile storage means having a storage area for the consumable data, means for transferring the consumable data received by the receiving means to the non-volatile storage means and means for altering the level of the consumable data stored in the non-volatile storage means.

Other aspects and subsidiary features of the present invention are disclosed in the appended claims.

In a particular implementation of the device it comprises a two-way pager having a non-volatile memory for storing consumable data such as monetary units, and/or credit card details. The size of the pager is substantially the same as a currently made plastic smart card but the thickness is greater and is equal to approximately six standard plastic cards. In an alternative implementation the device could be of a size comparable to a remote radio controlled electronic car door key. A notable advantage of what may be termed a two-way paging smart card over and above the standard smart card is that the consumable data, which in this instance comprises monetary units can be credited to the non-volatile memory by the transmission of a suitable radio message from the primary station. Optionally deductions of monetary units from the non-volatile memory may be done over the air. The transmission of the monetary units may be initiated by the user following checking of the credit balance in the non-volatile store or maybe effected automatically by the level of monetary units being monitored and when the level has reached or has gone below a pre-selected threshold value then the device transmits automatically a request message to the primary station which responds by sending a topping up message to the device. In the interests of security the uplink message from the pager contains a personal identification number (PIN) associated with that user which PIN may together with the unique address of the pager provide the necessary level of security to ensure that only the intended device is credited with the transmitted monetary units.

When using the device as a credit card, the device is presented at the point of sale where the details of the proposed sale or transaction are entered. These details together with the details of the credit card, for example the card number and expiry date, and the user's PIN, are transmitted to the primary station which relays them to the credit card centre. At the centre, a check is made that the amount to be debited does not take the user's account over its credit limit, and if not, the credit card centre sends an authorisation of the

transaction over-the-air to the device via the primary station. The retailer at the point-of-sale is immediately advised that the transaction is valid and completes the sale. Conversely the retailer is advised immediately if the proposed transaction is not authorised for example because the user's credit limit would be exceeded or the card has been invalidated because it has been reported as being lost or stolen and in consequence does not complete the sales transaction.

The device may by means of a man/machine interface be used to call up and display financial information on a display panel. The information may comprise a list of the more recent transactions or a statement of the users account at a bank or credit card centre.

Brief Description of Drawings

The present invention will now be described, by way of example, with reference to the accompanying drawings, wherein:

Figure 1 is a block schematic diagram of one embodiment of a system made in accordance with the present invention, and

Figure 2 is a diagram of the device in use.

Modes for Carrying Out the Invention

The system shown in Figure 1 comprises at least one primary station 10 which is fixedly sited and a plurality of transportable devices or secondary stations 12 of which one is shown in detail. The primary station 10 comprises an input interface 14 which is coupled by a land line 16 to an external data base 18 which may comprise a bank and/or credit card centre. Input information to the input interface 14 is encoded, optionally encrypted, and formatted in a stage 20 under the control of a controller 22. The data may be formatted in accordance with a known type of paging signal protocol such as the CCIR Radio Paging Code No. 1 (alternatively known as POCSAG). In accordance with the POCSAG protocol the address of a secondary station to which the encoded message is to be sent is appended to the front of the

message, the addresses of all the pagers operating on the system are stored in an address store 24. The encoded and formatted message is supplied to a transmitter 26 from where it is propagated by way of an antenna 28 and an intervening diplexer 30 as a point-to-point downlink signal.

Any uplink radio signals to the primary station 10 are detected by the antenna 28 and passed to a receiver 32 by way of the diplexer 30. The received signals are demodulated and decoded in a decoder 34. Those messages which are destined for the data base 18 are supplied to it from an output interface 36 which is also coupled to the land line 16.

The secondary station 12 comprises an antenna 38 coupled to a receiving stage 40. An output of the receiving stage 40 is coupled to a decoder 42 which decodes and, if appropriate, decrypts the received signal and passes its output to a microcontroller 44. The microcontroller 44 is operated in accordance with a program stored in a read-only memory 46. The microcontroller 44 has outputs coupled to a display driver 48 of an LCD panel 50, to an annunciating device as represented by a loudspeaker 52, to a random access memory 54 for storing messages and to a non-volatile store 56 which stores consumable data which is relayed from the data base 18 via the transmitter 26 and/or credit card number. A man/machine interface comprising a keypad 58 is connected to the microcontroller 44. An IRDA sensor and a set of electrical contacts 60 for interfacing with a card reading apparatus are coupled to the microcontroller 44. The microcontroller 44 is coupled to a transmitter 62 which has an output coupled to the antenna 38.

In one mode of operation the secondary station acts as a normal pager for alpha-numeric messages. Since this mode is well known in the art it will not be described in detail but for the sake of completeness reference is made to the "Book of the CCIR Radio-Paging Code No. 1" issued by the Secretary, Radio Paging Code Standards Group, British Telecom, London.

In a second mode the secondary station 12 functions as the equivalent of a smart card and is able to store a variety of information in its non-volatile store 56 for use later. The secondary station may operate as an electronic

cash card in which monetary units have been loaded into the non-volatile store 56 by way of radio transmissions from the primary station 10. In one arrangement a user by virtue of suitably actuating the keypad 58 is able to display on the LCD panel 50 the amount of cash which he or she wants to be loaded into the non-volatile store 56 for subsequent use. This may be effected by displaying several preset amounts, one of which is selected by the user using a cursor. Having selected the amount, the microcontroller 44 formats a request message and adds the user's PIN code. The request message is transmitted as a point to point signal via the transmitter 62 to the receiver 32 in the primary station 10. The signal may be transmitted as a pseudo random bit sequence. The message is decoded and the PIN number is checked against PIN numbers associated with addressees in the address store 24. If it is confirmed that the request message is a genuine message then a request is sent by the controller 22 by way of the output interface 36 to the data base 18. The data base 18 checks that the user's bank account is in credit and, assuming that it is, an authorisation of the amount is sent to the input interface 14. The controller 22 takes the message indicating the amount of the monetary units to be credited to the user together with the PIN number and appends the user's address. The encoder 20 encodes and formats the message data which is passed to the transmitter 26 for transmitting as a point-to-point signal in the appropriate frame of the POCSAG message to the secondary station.

The secondary station 12 is energised in accordance with the battery economising protocol of the paging system and on receiving a transmission at the receiver 40, it is decoded in the decoder 42 and passed to the micro-controller 44 for checking that the message is addressed to this particular secondary station and as an additional security check the PIN number is compared to the one assigned to the pager user. If both check out satisfactory then the monetary units are transferred to the non-volatile store 56.

The secondary station 12 can thereafter be used as a smart card and deduction of monetary units held in the non-volatile store 56 may be done by radio over the air or through a suitable IRDA or smart card reading station and

payment is effected by simultaneously crediting electronically monetary units to the supplier of goods or services and reducing the number held in the non-volatile store 56.

When the number of monetary units is low or has run out then the user may request more monetary units to be credited to his secondary station, assuming that he is in credit at the data base 18. Since such an operation may cause a time delay which may be irritating to the user, it is possible to put the secondary station into an auto-cash load mode. In this mode the micro-controller 44 monitors the number of monetary units in the store 56 and compares the number against a pre-selected threshold value. When the number of units has dropped to a value equal to or less than the threshold level, the microcontroller 44 formulates a request message which is transmitted via a transmitter 62 to the primary station 10. As before, the message is decoded and verified and assuming that the request is found to be genuine then the data base is asked to release a pre-determined number of monetary units to be credited to the particular secondary station. The user by requesting a current balance using the keypad can be advised of the number of monetary units held in the store 56 and also can get at least the more recent transactions displayed on the panel 50. The user may also request via the primary station that the data base 18 can give access to the current state of the user's bank account. Such messages will require the use of the PIN code.

In a situation of the users account being overdrawn and no further credit being given, the data base 18 can initiate the generation of a message which is relayed via the primary station to cause the paging smart card to be invalidated and to get the microcontroller 44 in the secondary station to generate and transmit a message confirming positively that the paging smart card has been invalidated.

The paging smart card can be revalidated by taking it to a bank or by the transmission of an over-the-air message.

In the event of the secondary station being lost or stolen, it can be disabled by an over-the-air message sent by the primary station 10 in response

to it being notified of the loss or theft.

When using the secondary station 12 as a credit card, the secondary station is presented at the point of sale where the details of the proposed sale or transaction are entered. These details together with the details of the credit card, for example the card number and expiry date, and the user's PIN, stored in the non-volatile store 56, are transmitted to the primary station 10 which relays them to the data base 18 which functions as a credit card centre. At the data base 18 a check is made that the amount to be debited does not take the user's account over its credit limit, and if not, the data base 18 sends an authorisation of the transaction over-the-air to the device via the primary station 12. The retailer at the point-of-sale is immediately advised that the transaction is valid and completes the sale. Conversely the retailer is advised immediately if the proposed transaction is not authorised for example because the user's credit limit would be exceeded or the card has been invalidated because it has been reported as being lost or stolen and in consequence does not complete the sales transaction.

The secondary station 12 can also store details of all purchases made and the current standing credit limit. Such information can be displayed at the user's convenience on the LCD panel 50.

Figure 2 illustrates the secondary station 12 in an IRDA reader 64 at a point of sale. A remotely located primary station 10 communicates by point-to-point messages with the secondary station. The data base 18 is shown coupled to the primary station 10.

Assuming that the secondary station 12 also functions as a loyalty card for a supermarket 66, the supermarket computer 68 is coupled to the IRDA reader 64 and to the primary station 10. A connection 70 to the IRDA reader 64 enables the computer to monitor the customer's purchases, award loyalty points and give discounts whenever appropriate. The supermarket 66 can advise all or selected customers, via the radio link between the primary and secondary stations, of special offers, new products, new or changing services and the like, and the customers by virtue of the uplink can reserve or buy

goods, payment being made at the time of ordering or later at collection by credit card deductions or deductions of monetary units.

Further in the event of a user making a purchase of say travel or theatre tickets by telephone or electronically, payment can be effected over-the-air without having to go to a point-of-sale, evidence of the transaction being stored in the non-volatile store.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the design, manufacture and use of data transmission apparatus and component parts thereof and which may be used instead of or in addition to features already described herein.

Industrial Applicability

A method of, and system for, for effecting cash transactions in a cashless manner.

CLAIMS

1. A method of effecting a cashless transaction in which payment is effected through the agency of a device comprising a point-to-point radio transceiver having a non-volatile storage means containing data required in the execution of the transaction.

2. A method as claimed in claim 1, characterised in that the non-volatile storage means stores monetary units from which deductions are made in a payment transaction.

3. A method as claimed in claim 1, characterised in that the non-volatile storage means stores credit card details and payment is effected as a credit card transaction.

4. A method of effecting a cashless transaction, comprising presenting a device having a point-to-point radio transceiver and a non-volatile storage means storing units of consumable data to a point of sales, effecting payment by deduction of at least one unit of the consumable data from those stored in the non-volatile storage means by a two-way radio transaction or by a credit transaction, relaying details of the transaction to a remote primary station and storing details of the transaction in the non-volatile storage means.

5. A method as claimed in Claim 4, characterised by the device transmitting a request message to the primary station to replenish the consumable data in the non-volatile storage means, the primary station in response to verifying that the request message is genuine, transferring consumable data as a radio signal to the requesting device, said device storing the consumable data in the non-volatile storage means.

6. A method as claimed in Claim 5, characterised by the device

monitoring the level of the consumable data in the non-volatile storage means and when the level reaches or is below a preselected threshold level, it automatically sends a request message to the primary station.

7. A system for effecting a cashless transaction, comprising a device having point-to-point radio transceiving means and a non-volatile storage means containing data required in the execution of a transaction.

8. A system as claimed in Claim 7, characterised in that the data comprises monetary units and in that the system further comprises a primary station having radio transceiving means for transferring monetary units to the device by a point-to-point over-the-air transmission.

9. A system for transferring consumable data to a non-volatile memory, comprising a primary station having means for connection to a source of the consumable data and means for transmitting at least some of the consumable data when required, at least one secondary station having receiving means for receiving signals transmitted by the primary station, a non-volatile storage means having a storage area for the consumable data, means for transferring the consumable data received by the receiving means to the non-volatile storage means and means for altering the level of the consumable data stored in the non-volatile memory.

10. A system as claimed in Claim 9, characterised in that the device comprises transmitting means and in that the primary station comprises receiving means for receiving signals transmitted by the secondary station.

11. A system as claimed in Claims 9 or 10, characterised in that the secondary station comprises control means for controlling the operation of the device, display means for displaying data, and man-machine interface means for enabling a user to input requests for transmission to the primary station and

to request the control means to display signals to be transmitted, signals which have been received or selected information currently stored in the non-volatile storage means.

12. A system as claimed in Claim 10 or 11, characterised by means for monitoring the level of the consumable data currently held in the non-volatile storage means and in response to the current level dropping to or below a preselected minimum level, the means generates a message to be transmitted to the primary station requesting that the level of the consumable data in the non-volatile storage means be topped-up.

13. A device for use in effecting a cashless transaction, the device comprising point-to-point radio transceiving means and a non-volatile storage means containing data required in the execution of a transaction.

14. A secondary station for use in a system for transferring consumable data to a non-volatile memory, the system comprising a primary station having means for connection to a source of the data and means for transmitting the data when required and at least one secondary station, the secondary device having receiving means for receiving signals transmitted by the primary station, non-volatile storage means having a storage area for the consumable data, means for transferring the consumable data received by the receiving means to the non-volatile storage means and means for altering the level of the consumable data stored in the non-volatile storage means.

15. A secondary station as claimed in Claim 14, characterised by transmitting means for transmitting signals to the primary station.

16. A secondary station as claimed in Claim 14 or 15, characterised by control means for controlling the operation of the device, display means for displaying data, and man-machine interface means for enabling a user to input

requests for transmission to the primary station and to request the control means to display on the display means signals to be transmitted, signals which have been received or selected information currently stored in the non-volatile storage means.

17. A secondary station as claimed in Claim 16, characterised by control means for monitoring the level of the consumable data currently held in the non-volatile storage means and in response to the level dropping to or below a preselected minimum level, the control means generates a message to be transmitted to the primary station requesting that the level of the consumable data in the non-volatile storage means be topped-up.

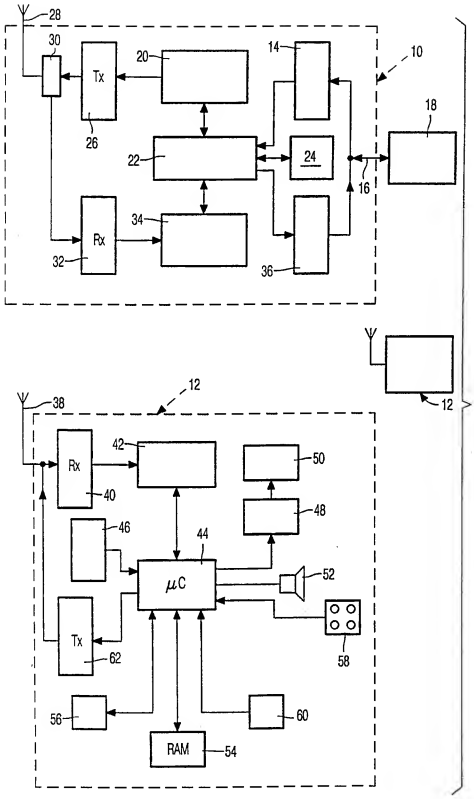
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FIG.1

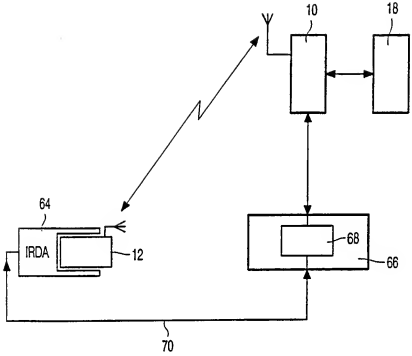

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 98/01185

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G07F 19/00 // G07F 7/08
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9613814 A1 (VAZVAN, BEHRUZ), 9 May 1996 (09.05.96)	1-17
X	WO 9411849 A1 (VATANEN, HARRI, TAPANI), 26 May 1994 (26.05.94)	1-17
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X	GB 2310069 A (NEC CORPORATION), 13 August 1997 (13.08.97)	1-17

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 December 1998	21 -12- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Magnus Thorén Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

01/12/98

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